1978

K-TAC'S ROLE IN COMMERCIALIZATION OF NEW TECHNOLOGY IN KOREA

Korea Technology Advancement Corporation(K-TAC)

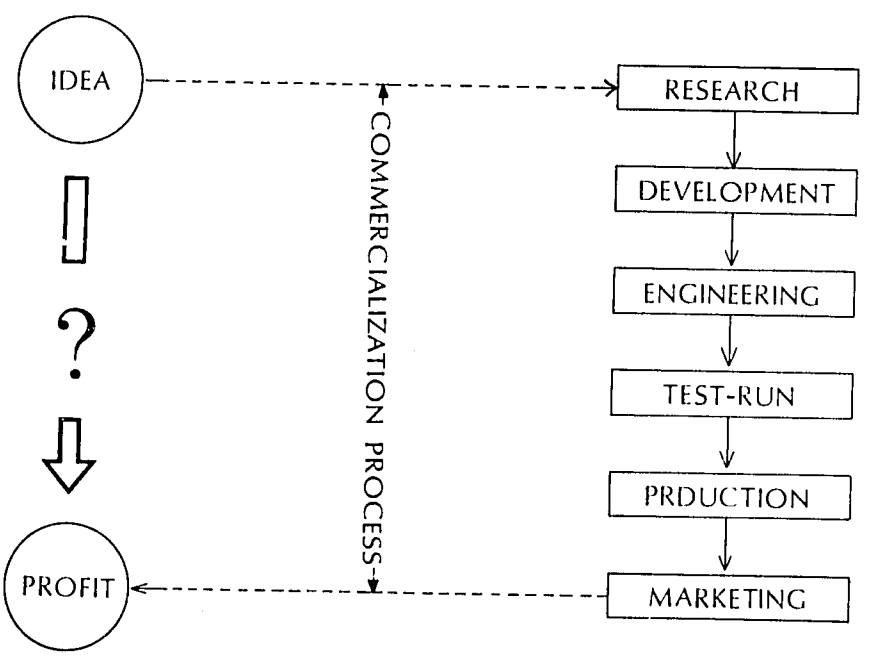
- CONTENTS -

I. COMMERCIALIZATION OF NEW TECHNOLOGY

1. PROCESS FOR COMMERCIALIZING NEW TECHNOLOGY

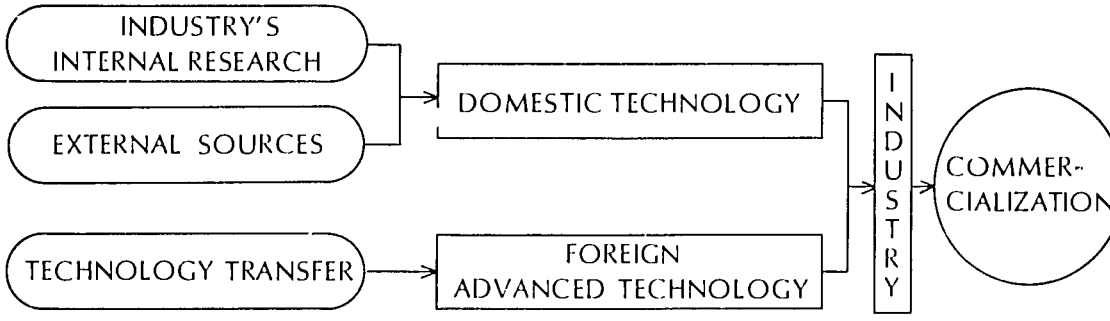
In general, when a technology has become really productive in economic activities, it has gone through six consecutive stages, and they are: (1) Research, (2) Development, (3) Engineering, (4) Test-Run, (5) Production, and (6) Marketing.

It is often misunderstood that a good R & D result would yield a profit right away and as is often the case with developing countries, entrepreneurs fail to recognize that the latter four stages of commercialization, which require higher investment, effort and patience than for R & D stages and are indispensable for the successful conversion of an R & D result to a profit-making enterprise.
(See the diagram below)



2. PROCUREMENT OF INDUSTRIAL TECHNOLOGIES

- Industrial technologies are acquired either through technology transfer from abroad or through domestic development. The domestic technologies are generated either from the industry's internal research activities or from external sources like private inventors or research organizations, etc.(See the diagram below)



- Complete commercialization of a domestic technology can be achieved by going through all the six stages of commercialization process. However, in the case of the technology transfer from abroad, it often takes the form of purchasing the complete package of the six stages.

- R & D activities outside the industry include those conducted in research institutes or universities, etc., and the Korea Institute of Science and Technology(KIST) plays an important role in developing technologies in Korea as a non-profit contract research organization.

- It is imperative for both the industry and research organizations to carry out as many technological developments as possible after selecting research subjects to be carried out domestically.

- Active R & D activities should be encouraged for the accumulation of domestic technologies as well as the development of the capability to select, digest and improve the technologies to be transferred from abroad.

3. NECESSITY FOR THE PROMOTION OF COMMERCIALIZATION ACTIVITIES

The ultimate purpose of R & D activities lies in the commercialization of the technology in even aspect. Hence, the delay in the commercia - lization of any developed technologies would cause the following adverse effects.

A. Extravagant use of research funds

B. Lessening the extent of technological contribution to domestic industrial development

C. Industry's distrust in the indigenous research activities.

D. Decrease of morale in research community

4. CAUSES FOR DELAYED COMMERCIALIZATION

- There are many suitable technologies available for commercialization as small and medium scale enterprises on an investment scale of upto $ 4 million among all the domestically developed technologies.

In recent years, large corporations in Korea have accumulated the capability for commercializing new technologies by themselves. However, medium and small scale industries are in general discouraged in such activities due to the following reasons.

A. Lack of Understanding on the part of entrepreneur for the commercialization of new technology

B. Lack of experience in managerial capability in the process of commercialization

C. Specialists are not available internally and difficult to acquire from outside sources.

D. Heavy financial burden in the test-run stage

E. Local banks are unwilling to finance due to the high risk of new enterprise.

Ⅱ. KOREA TECHNOLOGY ADVANCEMENT CORPORATION(K-TAC)

1. BACKGROUND AND PAST PROGRESS

● Delays in the commercialization of new technology in Korean industry have made it necessary to establish a special body to facilitate the commercialization process.

Having analyzed the circumstances existing between industry and research organizations, the Korea Institute of Science and Technology (KIST) established on a trial basis with KIST's sole investment of $ 60,000 the Korea Technology Advancement Corporation (K-TAC), an independent corporation to play the role of facilitating the commercialization of R & D results.

● Commercialization activities are separated from R & D activities in nature. So, under KIST's sole investment, K-TAC took the form of an ordinary private corporation rather than government-aided organization to give mobility and flexibility in operation and well-defined responsibility.

● Business activities of K-TAC have been focused on the commercial promotion of R & D results including sales of knowhow, by-products and prototypes resulting from R & D activities, and managerial control of subsidiaries. From over 50 developed technologies for which feasibility studies have been made in the past, K-TAC has selected more than 10 of them for commercilization projects and

these are presently progressing successfully.

Consequently, K-TAC has grown to a corporation with paid-in capital of more than $ 1, 400, 000.

2. HISTORICAL NOTES

Sept. 1974 Establish K-TAC(KIST's sole investment)

Aug. 1975 Sales of knowhow – Mfg technology for fluorocarbon

Nov. 1975 Establish Korea Synthetic Fiber Ind. Co., Ltd (Joint-Venture) – Mfg technology for modacrylic fiber for wigs

Jan. 1976 Start metal powder mfg project under direct management of K-TAC – Mfg technology for metal powder of copper and its alloys.

Mar. 1976 Sponsor R & D project to develop kneader and feeder for the artificial diet for silkworms (ADS) in KIST's Animal Feedstuff Lab.

May 1976 Test breeding of silkworms using artificial feedstuff (Boeun, Choong-buk Province)

May 1976 Establish Nam-Hae Ceramics Co., Ltd. (J-V)
– Mfg technology for refractory saggar

Sept. 1976 Completion of the construction of metal powder plant

Oct. 1976 Sales of business entity-KOSFIC to Dong-Yang Nylon Co., Ltd.

Mar. 1977 Establish Hahn-Jung Chemicals Co., Ltd(J-V)
—Mfg technology for chemical intermediates of agricultural insecticide.

May 1977 2nd test breeding of silkworms using artificial feed-stuff(Yeo-Joo, Kyung-gi Province)

July 1977 Agreement on the establishment of a new company for ADS production until the end of 1979, between K-TAC and Kyung-Gi Silk Industrial Co., Ltd.

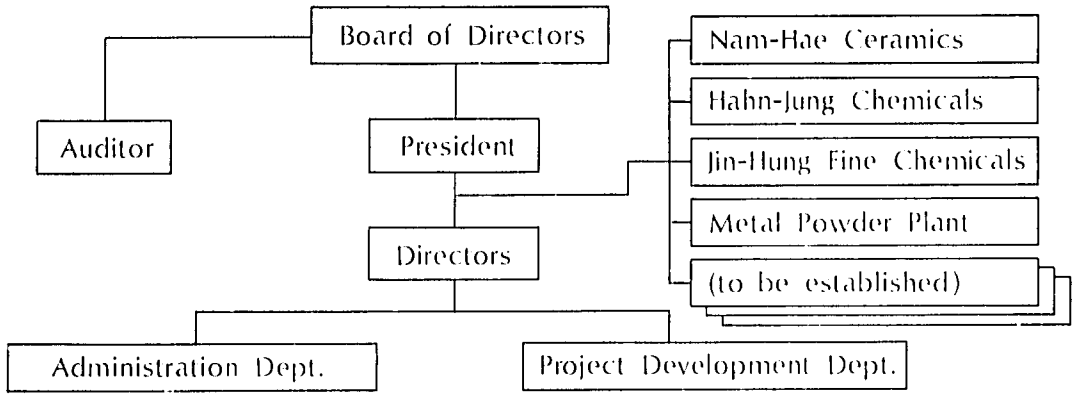
Aug. 1977 Start selling ADS(Small quantity of by-product from pilot plant)

Oct. 1977 Complete the construction of refractory saggar mfg plant(Mil-yang, Kyung-nam Province)

Dec. 1977 Complete the construction of HOP plant(In-chon, Kyung-gi Province)

Feb. 1978 Establish Jin-Hung Fine Chemicals Co., Ltd(J-V)
—Mfg technology for technical grade agricultural chemicals

3. ORGANIZATION

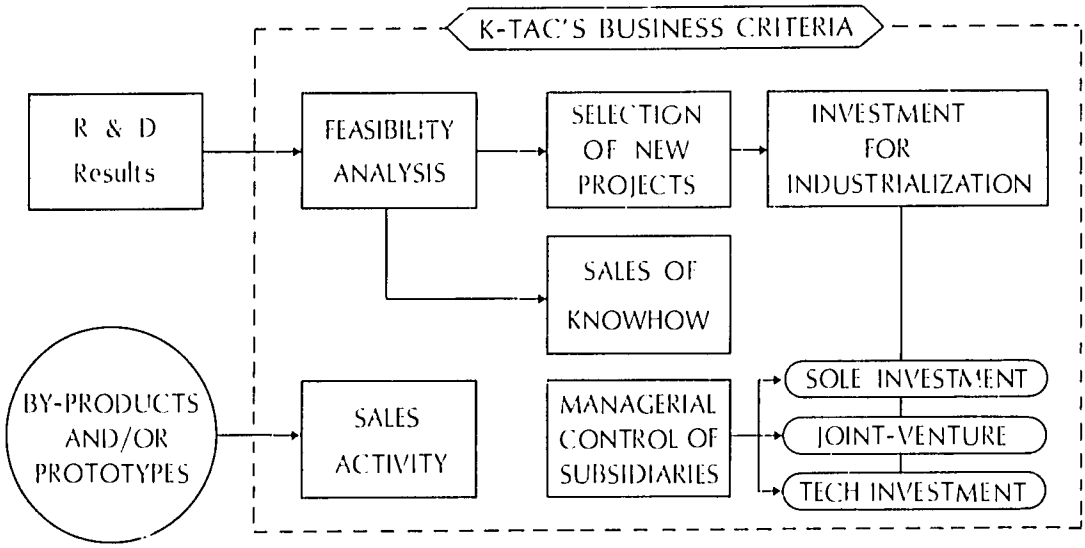


- General Affairs
- Accounting
- Managerial Control of Subsidiaries
- Support to Project Development

- Sales of Knowhow
- Sales of Prototypes and By-products
- Selection of projects to Be Invested
- All Related Activities for Commercialization.

4. BUSINESS CRITERIA

All sorts of newly developed industrial technologies become the object of K-TAC's commercialization activities and the following diagram shows the business criteria of K-TAC.



5. PROJECT SELECTION PRIORITIES

The decision whether or not to select a project for commercialization is made by K-TAC according to the following selection priorities, after conducting feasibility study for each newly developed technology.

A. Degree of technological innovation involved in the planned project

B. Effects on the national economy such as import substitution and export promotion

C. Financial return-Profitability

D. Whether or not the products to be oriented toward industrial market rather than consumer market

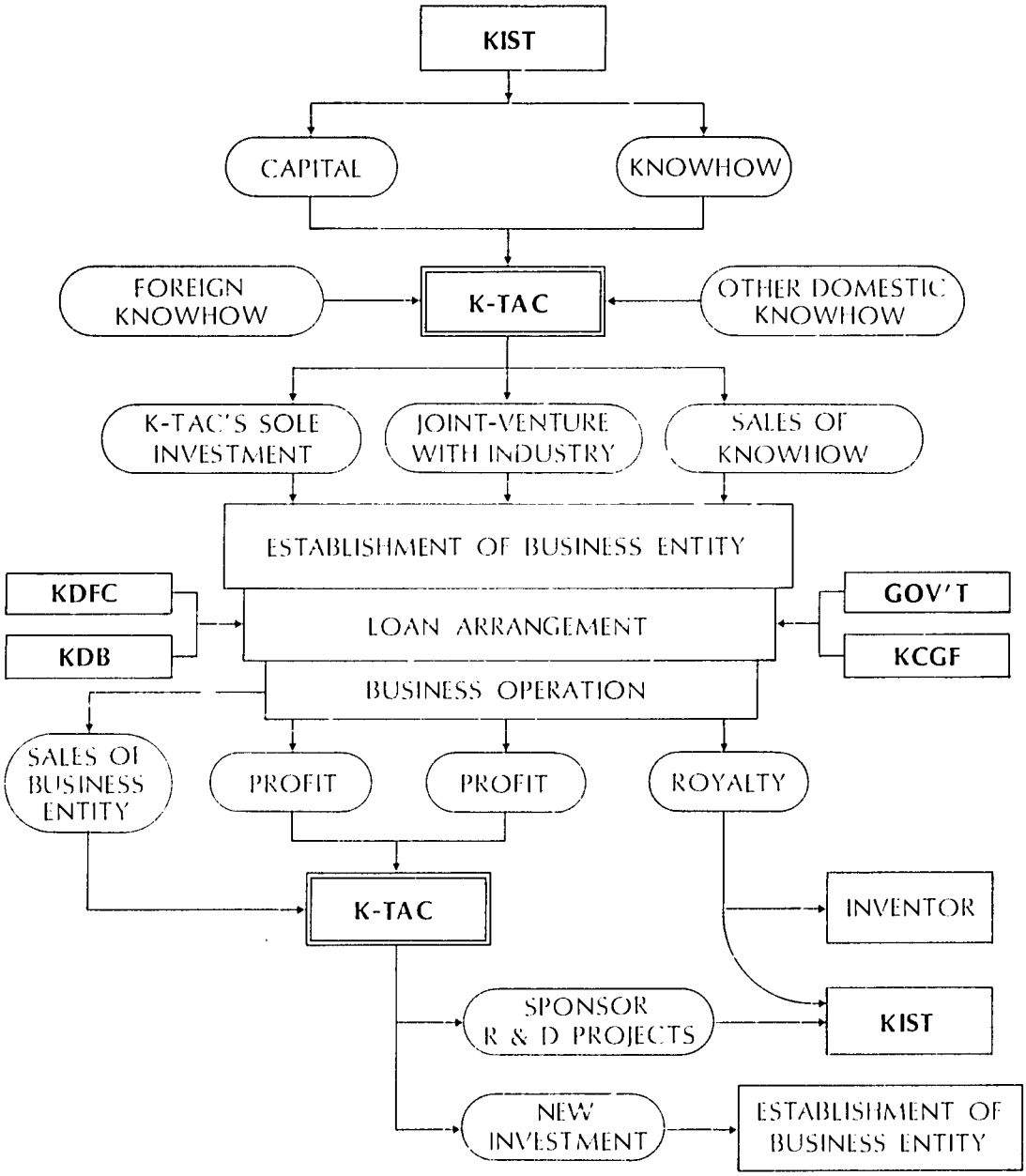
E. Possibility for starting as a small and medium scale industry

6. FUNCTIONS OF K-TAC

Since its establishment in 1974, K-TAC has been in close relation with the Korea Development Finance Corporation (KDFC) while establishing a cooperational relationship with the Korea Credit Guarantee Fund(KCGF).

Encouraged by Governmental measures such as the establishment of the Technology Development Fund and the enactment of the Technology Development Promotion Law, K-TAC has been successfully expanding its activities for the commercialization of new technologies. K-TAC's functional relationship to relevant organizations is shown in the following diagram.

FUNCTIONAL RELATIONSHIP TO CONCERNING ORGANIZATIONS



KDFC···Korea Development Finance Corp.
KDB ···Korea Development Bank
KCGF···Korea Credit Guarantee Fund

7. CHARACTERISTICS OF K-TAC'S PROJECT

All the projects currently in progress and with which K-TAC is directly involved for commercialization, are actually for newly developed technologies, and these projects will consequently contribute to the structural improvement of domestic industries in accordance with K-TAC's ultimate purpose of making contribution to the national economic development. These projects are therefore distinguished from others in the following characteristics.

A. Small and medium scale industry

B. Aiming at import substitution and/or export promotion

C. Specialized and vertically integrated in the present industrial circle

D. Considered to be reliable for the technology due to K-TAC's direct equity participation

E. Specialists for commercialization are dispatched for the project (Withdrawn after successful commercialization)

F. Whole business entity is transferrable to private entrepreneurs after successful commercialization

8. RECORD OF PROJECT DEVELOPMENT

(Refer to Appendix)

APPENDIX

RECORD OF PROJECT DEVELOPMENT

PLANT UNDER K-TAC'S DIRECT MANAGEMENT

.....PLANT OPERATION FOR METAL POWDER MANUFACTURING

SALES OF KNOWHOW

.... MANUFACTURING TECHNOLOGY FOR FLUOROCARBON(KORFRON12)

SALES OF BUSINESS ENTITY

.... PROJECT FOR MANUFACTURING SYNTHETIC FIBER FOR WIGS

COMMERCIALIZATION BY JOINT - VENTURE INVESTMENT

A. REFRACTORY SAGGAR MANUFACTURING

.... NAM HAE CERAMICS CO., LTD.

B. PRODUCTION OF CHEMICAL INTERMEDIATES FOR AGRICULTURAL INSECTICIDE

.... HAHN-JUNG CHEMICALS CO., LTD.

C. PRODUCTION OF TECHNICAL GRADE AGRICULTURAL CHEMICALS

.... JIN-HUNG FINE CHEMICALS CO., LTD.

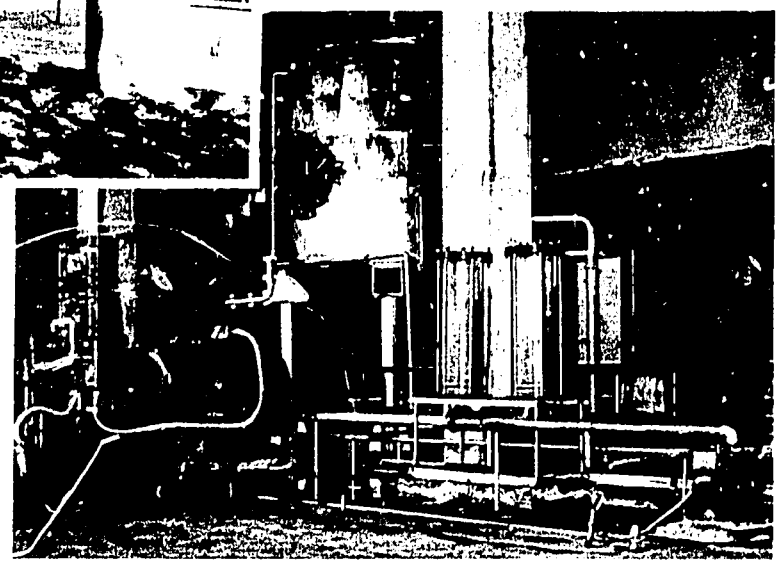
MARKETING DEVELOPMENT

.... PROJECT FOR MANUFACTURING ARTIFICIAL DIET FOR SILKWORMS(ADS)

PLANT UNDER K-TAC'S DIRECT MANAGEMENT

PLANT OPERATION FOR METAL POWDER MANUFACTURING

FRONT-VIEW OF THE METAL POWDER PLANT CONSTRUCTED IN BU-PYONG



INSIDE THE FACTORY: FACILITIES FOR WATER-ATOMIZING PROCESSS

TECHNOLOGY DEVELOPMENT

KIST's Process Metallurgy Laboratory

PRODUCTS . . . . Powders of Bronze, Brass, Kelmet, etc.

USES . . . . . Oilless Bearing, Electric Contact, Sintered Mechanical Parts, etc.

HISTORY IN BRIEF

Jan 1976 - Sep 1976	Plant Construction (Bu-pyong, Kyung-gi Province)
Oct 1976 - Apr 1977	Pilot Production and New Product Development
From May 1977	Normal Operation

FINANCING (As of April 1978)

Long-term Loan (from KDFC)	US$181,840
K-TAC's Capital Investment	US$459,520
Total :	US$641,360

INVESTMENT (As of April 1978)

Fixed Assets	US$259,160
Deferred Assets	US$ 92,000
Working Capital	US$128,130
Market Development.	US$162,070
Total :	US$641,360

PRODUCTION CAPACITY

180 M/T per year (US$1,000,000)

Note : Planning for doubling the capacity in 1979

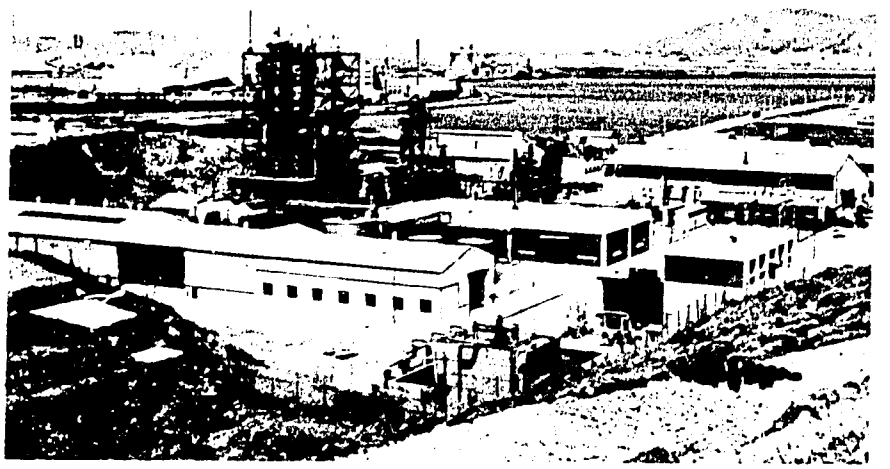
EXPECTED EFFECTS

Import Substitution . . . US$1,000,000 per year

Creation of New Employment . . . About 30 people

SALES OF KNOWHOW

[illegible] TECHNOLOGY FOR FLUOROCARBON (KORFRON-12)



PLANT FACILITIES:
KOREA FLUORO-CHEMICAL IND. CO., LTD. IN WOOL-SAN

TECHNOLOGY DEVELOPMENT

KIST's Polymer Laboratory

PRODUCTS ----- KORFRON-12, etc.

Note : KORFRON is a trade name which is the same as FREON of U.S.A. and FLON of Japan.

USES -------- Refrigerant, Aerosol, Cleaning Agent, Raw Material for Polymer Synthetics, etc.

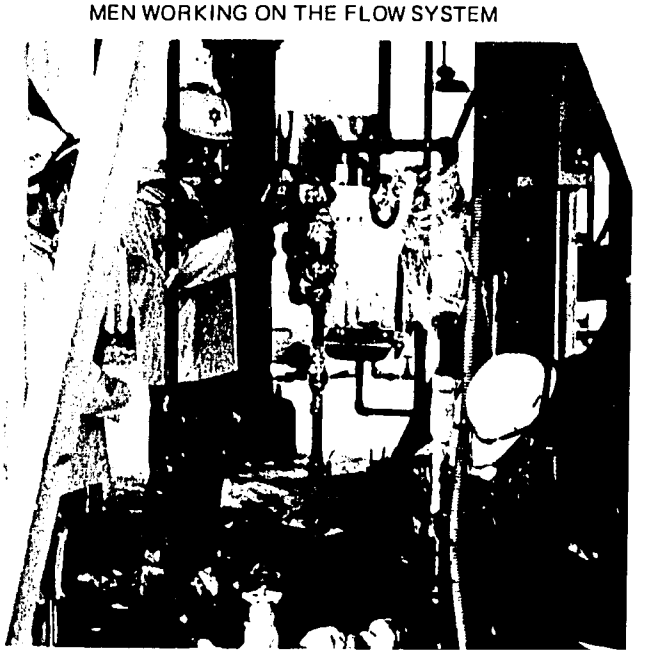
PRODUCTION CAPACITY

2,000 M/T per year (based on KORFRON-12 only)

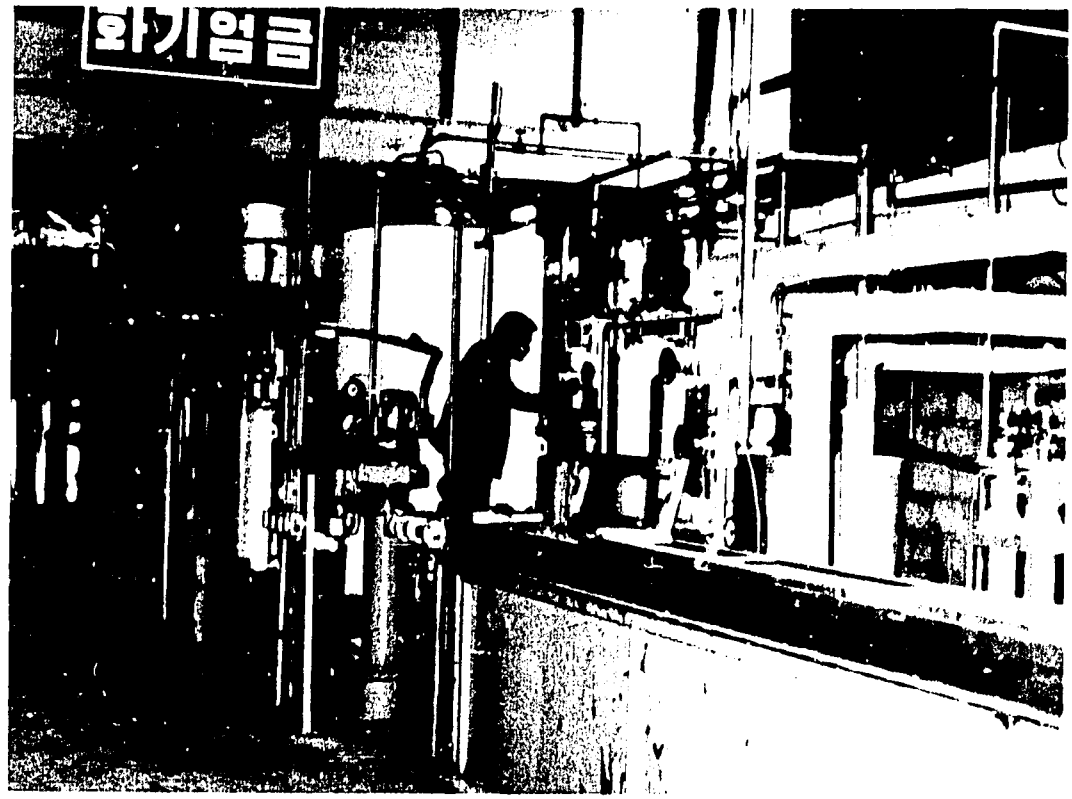
HISTORY IN BRIEF

Apr 1970-May 1973	Test Production in KIST's Pilot Plant
Aug 1975	Sell the Knowhow to Korea Fluoro-Chemical Ind. Co., Ltd. (Price : US$288,660)
Sep 1975-Nov 1977	Plant Construction(Woolsan, Kyung-nam Province)
From Nov 1977	Test-Run and Normal Operation

MEN WORKING ON THE FLOW SYSTEM



SALES OF BUSINESS ENTITY



TEST-OPERATION IN KIST'S PILOT PLANT

TECHNOLOGY DEVELOPMENT

KIST's Polymer Laboratory

PRODUCTS . Modacrylic Fiber in Various Colors

USES ..... Wig Material

HISTORY IN BRIEF

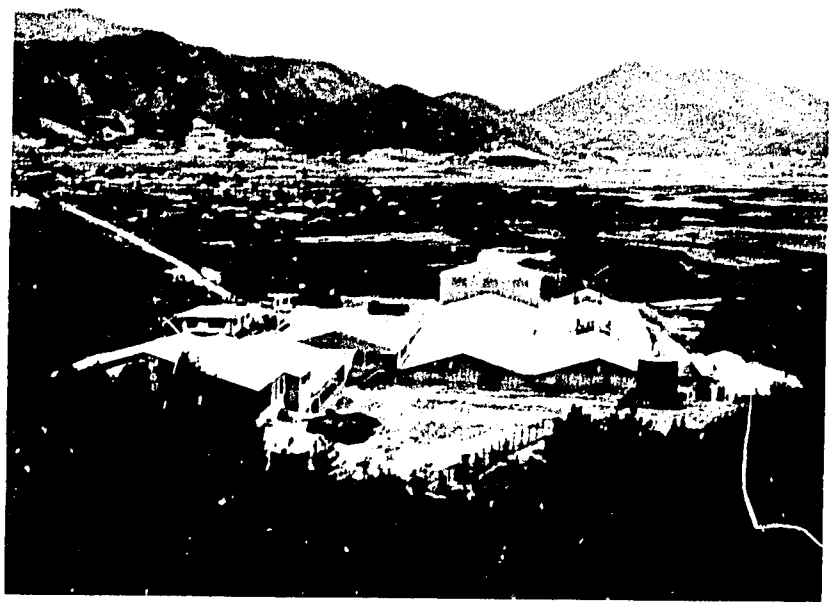
Nov. 1975	Establish Korea Synthetic Fiber Ind. Co., Ltd. (Joint-Venture with Sees Trading Co., and other)
Feb. 1976-Jun. 1976	Detail engineering, Arrange long-term loan, Take over equity shares of Sees and other
Oct. 1976	Sell the whole business entity to Dong Yang Nylon Co., Ltd.
Feb. 1977	Liquidation of KOSFIC
Dec. 1977	Plant construction started by Dong Yang Nylon (Production capacity : 5mT/day)

TRANSFER OF BUSINESS ENTITY

* Dong Yang Nylon took over the whole company of KOSFIC compensating for all the cost that had originated by the business.
* The manufacturing knowhow for the production of synthetic fiber for wigs was also sold to Dong Yang Nylon. (Amount : US$412,000)

COMMERCIALIZATION BY JOINT-VENTURE INVESTMENT (CASE I)
– NAM-HAE CERAMICS CO., LTD.

REFRACTORY SAGGAR MANUFACTURING



REAR VIEW OF NAM-HAE'S REFRACTORY SAGGAR PLANT FACILITIES

TECHNOLOGY DEVELOPMENT

..... KIST's Ceramic Materials Lab

PRODUCTS .. Cordierite Refractory Saggar

USES..... Manufacturing mosaic tiles for interior decoration

HISTORY IN BRIEF

May 1976	Establish Nam Hae Ceramics Co., Ltd. (K-TAC's equity : 40%)
May 1976-Oct. 1977	Plant Construction (Mil-Yang, Kyung-nam Province)
From Oct 1977	Test-Run and Normal Operation

PRODUCTION CAPACITY

7,200 mT per Year (US$2,680,000)

FINANCING (As of April, 1978)

Technology Development Fund .. US$793,820
(from Korea Development Bank)

Foreign Loan (from KDFC)..... US$355,000

Equity Investments

K-TAC (40%) ..... US$329,900
KDFC (15%)..... US$123,710
Others(45%) ..... US$371,130

Total : US$1,973,560

EXPECTED EFFECTS

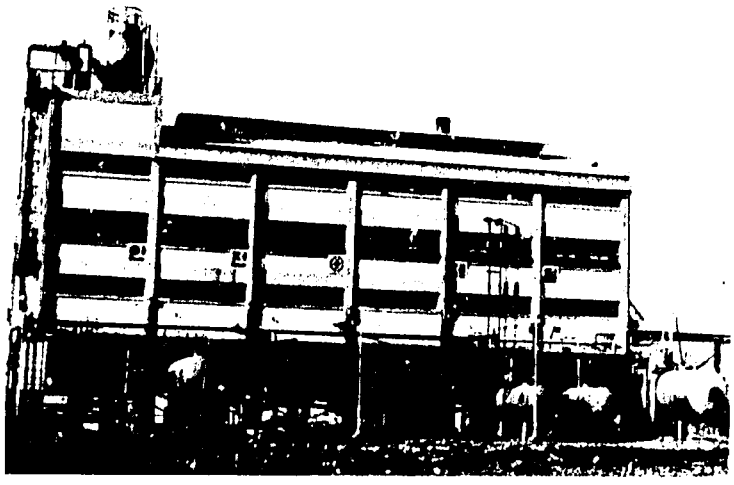
Import Substitution .. Over 2million dollars per year

Creation of New Employment.... About 140 people

PRESSES INSTALLED FOR COMPACTING SAGGARS

COMMERCIALIZATION BY JOINT-VENTURE INVESTMENT (CASE II)
– HAHN-JUNG CHEMICALS CO., LTD.

PRODUCTION OF CHEMICAL INTERMEDIATES FOR AGRICULTURAL INSECTICIDE



FRONT VIEW OF THE PLANT IN IN-CHON

PART OF FACILITIES INSIDE THE PLANT

TECHNOLOGY DEVELOPMENT

KIST's Organic Chemistry Lab.

PRODUCTS . . . . Chemical Intermediates(HOP, etc.)

USES . . . . . Raw Material for Insecticide (Diazinon, etc.)

HISTORY IN BRIEF

Mar 1977	Establish Hahn-Jung Chemicals Co., Ltd.(K-TAC's equity : 50%)
Mar 1977-Nov.. 1977	Plant Construction (In-chon, Kyung-gi Province)
From Nov. 1977	Test-Run and Normal Operation

PRODUCTION CAPACITY

600 mT per year (US$4,320,000)

FINANCING (As of April 1978)

Technology Development Fund (from Korea Development Bank)	US$845,360
Other Loans	US$824,740
Equity Investments	
K-TAC(32%)	US$309,280
* KACC (68%)	US$659,790
Total:	US$2,639,170

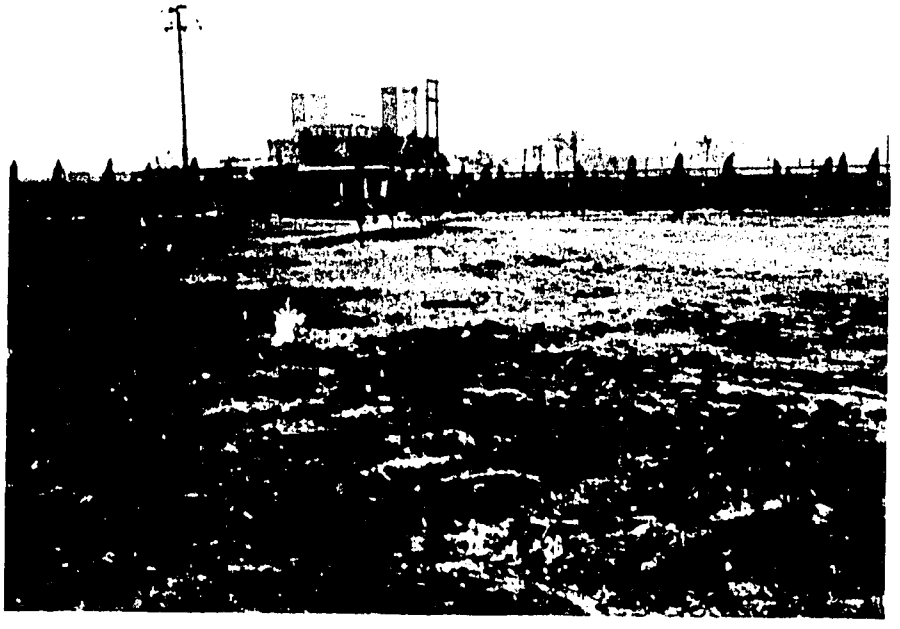
EXPECTED EFFECTS

Import Substitution . .	Over two million dollars per year
Creation of New Employment . . .	About 60 people

* Korea Agricultural Chemicals Co., Ltd.

COMMERCIALIZATION BY JOINT-VENTURE INVESTMENT (CASE III)
– JIN-HUNG FINE CHEMICALS CO., LTD.

PRODUCTION OF TECHNICAL GRADE AGRICULTURAL CHEMICALS



SITE FOR PLANT CONSTRUCTION

TECHNOLOGY DEVELOPMENT

.....KIST's Pharmaseuticals Research Lab

PRODUCTS .... DMOC (Technical Grade)

USES ..... Fungicide for Seed Treatment

HISTORY IN BRIEF

Feb 1978	Establish Jin Hung Fine Chemicals Co., Ltd. (K-TAC's equity ; 25%)
Apr 1978	Complete Pilot Plant Test
May 1978	Detail Engineering Contract with KIST

PRODUCTION CAPACITY

400 mT per year (US$5,150,000)

FINANCING PLAN

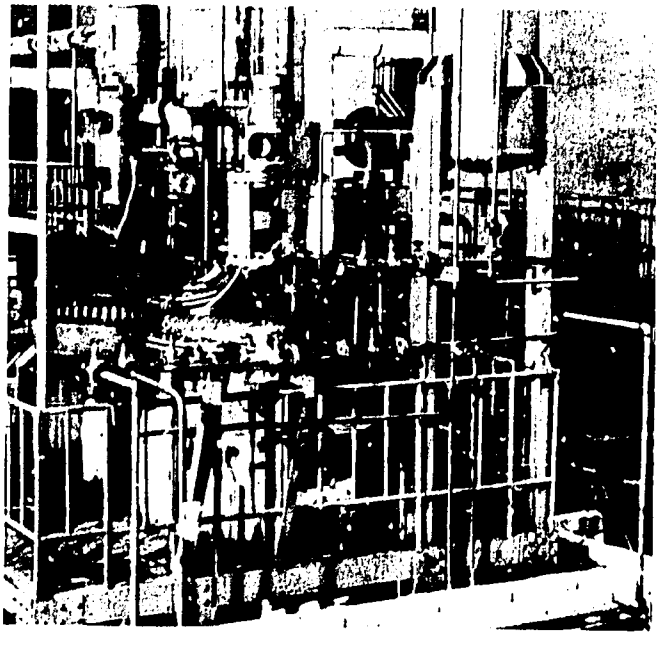
Technology Development Fund . US$1,030,920
(from Korea Development Bank)
Short-Term Borrowings..... US$ 618,550
Equity Investment
K-TAC(25%)..... US$206,190
KDFC(25%)..... US$206,190
Other(50%)..... US$412,380
Total : US$2,474,230

EXPECTED EFFECTS

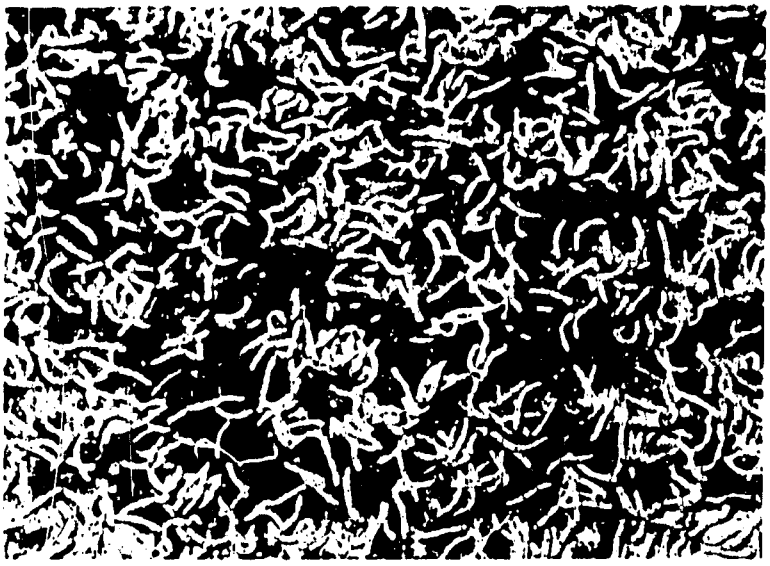
Import Substitution .. Over two million dollars per year

Creation of New Emplyment .. About 60 people

FACILITIES USED FOR PILOT TEST



PROJECT FOR MANUFACTURING ARTIFICIAL DIET FOR SILKWORMS



BREEDING OF SILKWORMS USING ARTIFICIAL DIET

COCOONS FRUITED

TECHNOLOGY DEVELOPMENT

.... KIST's Animal Feedstuff Lab.

PRODUCTS .... Artificial Diet for Silkworms (ADS)

USES..... Feedstuff for Silkworms in Sericulture

HISTORY IN BRIEF

Oct. 1975.... Selected for Commercialization Project

Mar 1976-May 1977 ... Development of Kneader and Feeder (KIST)

May 1976.... 1st Test Breeding (Boeun, Choongbuk Province)

May 1977.... 2nd Test Breeding (Yeo-joo, Kyunggi Province)

Jul 1977..... Agreement on the establishment of a new joint-venture company until the end of 1979, between K-TAC and Kyung-Gi Silk Ind. Co., Ltd.

Aug 1977 Start selling ADS (Small quantity of by-product from pilot plant)

PROJECT STRATEGY

* Make sericultural farmers recognize the advantages of using ADS in breeding silkworms instead of using mulberry leaves.
* Create new market for ADS until reaching the scale of economy.
* Establish a joint-venture company for the production and marketing of ADS until the end of 1979.

EXPECTED EFFECTS

* Cost reduction in breeding silkworms
* Make possible the all-weather sericulture
* Mulberry fields are convertible for other uses.

KOREA TECHNOLOGY ADVANCEMENT CORPORATION
SUBSIDIARY COMPANY OF
KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY(KIST)

HEAD OFFICE : 148, ANKUK-DONG, JONGRO-KU, SEOUL, KOREA
TEL : 75-5075, 73-3927, 73-3708
OFFICE IN KIST : P.O.BOX 131. DONG-DAE-MUN, SEOUL, KOREA
TEL : 967-7571, 967-8801 (EXT. 438)
CABLE : KISTROK SEOUL
TELEX : KISTROK K27380